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PROJECT TITLE:



Effect of Abdominal Tensioning on Maximal Grip Strength

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INTRODUCTION

Abdominal tensioning is a strengthening technique frequently applied during rehabilitation exercises. Drawing in (DI) is a common abdominal tensioning technique that utilizes breathing to help activate the abdominal muscles and more specifically, the transverse abdominis (TA) to a greater extent as the TA assists in breathing. The DI technique has been shown to improve abdominal activation and coordinated muscular support of the trunk (Kim & Lee, 2017) (Boyle, Olinick & Lewis, 2010). The purpose of our study was to determine if abdominal tensioning would have an effect on a more distal area by observing the effects on maximal grip strength (MGS). We have not seen a study examining the same specific effects that we aim to study. We hypothesized that performing a grip strength test while activating the abdominals with the DI technique would increase MGS through increased motor unit recruitment.

METHODS

Eleven participants completed the study. All participants were positioned supine in hooklying for all testing. A countdown was provided for the timing of events. The DI technique used during experimental trials, utilized inhalation and exhalation in a specific manner while engaging the abdominals and simultaneously providing a MGS value. Each subject performed two control (CON) and two experimental trials. The order in which the trials were performed was randomized by a coin flip before testing began. During the experimental trials, all subjects used the DI technique in order to activate the abdominal muscles while performing MGS test. For CON testing, subjects performed grip strength testing without using the DI technique. Rest breaks were provided between each trial for both dominant and non-dominant hands.

RESULTS AND DISCUSSION

When utilizing a paired t-test and analyzing both DI and CON testing overall for both dominant and non-dominant hand, results were that the t-value was .018. There was no statistically significant change in grip strength values ($p=0.6$) when the DI technique was utilized. The mean for the DI group was 39.3 kg with a standard deviation (SD) of ± 20.9 , while the mean for the CON group was 39.6 kg with a SD of ± 19.7 (Figure 2 & 3). Mean normalized data for all DI testing was 0.56 with a SD of ± 0.25 , while mean normalized data for all CON testing was 0.57 with an SD of ± 0.24 .

Although numerous studies have been done to examine the physiological effects that one region of the body has on another, no research has looked specifically at the relationship between abdominal tensioning and MGS, making it difficult to compare our results.

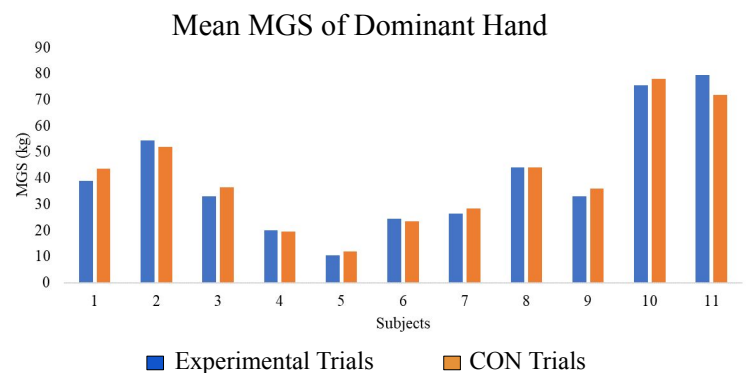


Figure 1: Average MGS test values in kilograms for the dominant hand of each subject. Experimental trials utilized the DI technique. CON trials did not utilize abdominal muscle activation.

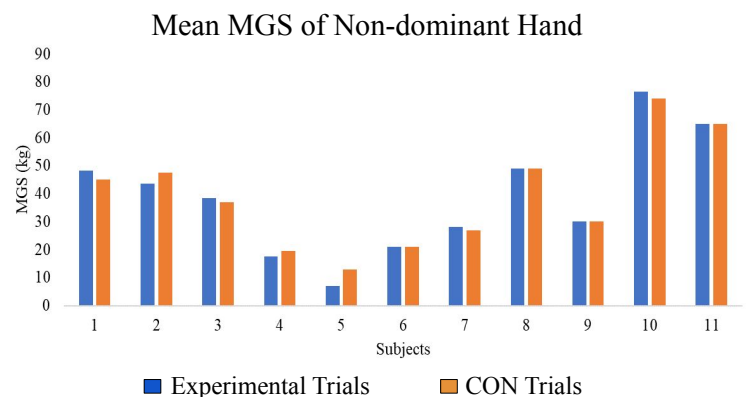


Figure 2: Average MGS test values in kilograms for the non-dominant hand of each subject. Experimental trials utilized the DI technique. CON trials did not utilize abdominal muscle activation.

CONCLUSIONS

These results indicate that using the DI technique while performing a grip strength test does not increase MGS. Although the DI technique may have many benefits, research has yet to indicate that it has effects distally regarding muscle activation. Our population was not representative of the rehab patients that typically use these techniques. Future research focusing on this population should be done to determine the potential benefit of distal strengthening through abdominal tensioning.